Infection Control Hospital Epidemiology



Artist: Nile Moss





s://doi.org/10.1017/ice 2023.238 Published online by Cambridge University Pre-

VERIFY WITH CONFIDENCE

HEALTHMARK'S CLEARLY VISIBLE, OBJECTIVE TESTS OF CLEANING METHODS



SCREEN WITH THE NOW! TEST

Rapid Indicator of Gram-Negative bacteria

Simply flush the lumen or swab the elevator mechanism of a flexible endoscope, such as a duodenoscope, and follow the procedure for gram-negative bacteria detection in less than 12 hours.

AUDIT WITH THE FLEXIBLE ENDOSCOPE SAMPLING KIT

For testing of duodenoscopes in compliance with FDA guidelines

After flushing and brushing the lumen and elevator mechanism of a duodenoscope, simply follow the procedure to have the sample solution & brush heads quickly sent to Nelson Laboratories, the leader in independent testing of flexible endoscopes.





MONITOR WITH **PROFORMANCE**[™] **CLEANING VERIFICATION TOOLS**

Perform weekly testing of all assets of the cleaning process

Challenge the cleaning efficacy of the ultrasonic bath with SonoCheck[™], the automated washer with TOSI[®], pulse-flow lumen washers with LumCheck[™], endoscope washers with FlexiCheck[™] and more!



FOR MORE INSTRUMENT CARE & INFECTION CONTROL SOLUTIONS, **VISIT HMARK.COM**

https://doi.org/10.1017/ice.2023.238 Published online by Cambridge University Press

Volume 44

2023

Number 10

CONTENTS

SHEA/IDSA/APIC Practice Recommendations

1533 Introduction to A Compendium of Strategies to Prevent Healthcare-Associated Infections In Acute-Care Hospitals: 2022 Updates Deborah S. Yokoe, Sonali D. Advani, Deverick J. Anderson, Hilary M. Babcock, Michael Bell, Sean M. Berenholtz, Kristina A. Bryant, Niccolò Buetti, Michael S. Calderwood, David P. Calfee, Valerie M. Deloney, Erik R. Dubberke, Katherine D. Ellingson, Neil O. Fishman, Dale N. Gerding, Janet Glowicz, Mary K. Hayden, Keith S. Kaye, Larry K. Kociolek, Emily Landon, Elaine L. Larson, Anurag N. Malani, Jonas Marschall, Jennifer Meddings, Leonard A. Mermel, Payal K. Patel, Trish M. Perl, Kyle J. Popovich, Joshua K. Schaffzin, Edward Septimus, Kavita K. Trivedi, Robert A. Weinstein and Lisa L. Maragakis

1540 Executive Summary: A Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute-Care Hospitals: 2022 Updates
Deborah S. Yokoe, Sonali D. Advani, Deverick J. Anderson, Hilary M. Babcock, Michael Bell, Sean M. Berenholtz, Kristina A. Bryant, Niccolò Buetti, Michael S. Calderwood, David P. Calfee, Erik R. Dubberke, Katherine D. Ellingson, Neil O. Fishman, Dale N. Gerding, Janet Glowicz, Mary K. Hayden, Keith S. Kaye, Michael Klompas, Larry K. Kociolek, Emily Landon, Elaine L. Larson, Anurag N. Malani, Jonas Marschall, Jennifer Meddings, Leonard A. Mermel, Payal K. Patel, Trish M. Perl, Kyle J. Popovich, Joshua K. Schaffzin, Edward Septimus, Kavita K. Trivedi, Robert A. Weinstein and Lisa L. Maragakis

Original Articles

1555 A surveillance program for long-term central venous access– associated infections in outpatient chemotherapy services

Maristela P. Freire, Denise Brandão Assis, Fabianne Carlesse, Juliana De Cassia Belizario, Priscila Costa Pimentel Germano, Juliana Monteiro Virolli, Anna Claudia Turdo, Beatriz Quental Rodrigues, Amanda Luiz Pires Maciel, Priscila Goncalves, Icaro Boszczowski, Edson Abdala and Anna S. Levin

- **1562** Preventing nosocomial bloodstream infections (NBSIs) by implementing hospitalwide, department-level, self-investigations: A NBSIs frontline ownership intervention *Hadar Mudrik-Zohar, Michal Chowers, Elizabeth Temkin and Pnina Shitrit*
- **1569** Clinical outcomes associated with blood-culture contamination are not affected by utilization of a rapid blood-culture identification system *Sidra Liaquat Khan, Gleb Haynatzki, Sharon J. Medcalf and Mark E. Rupp*
- **1576** Blood culture procedures and practices in the neonatal intensive care unit: A survey of a large multicenter collaborative in California *Linda Lefrak, Kristen E. Schaffer, Janine Bohnert, Peter Mendel, Kurlen S.E. Payton, Henry C. Lee, Michael A. Bolaris and Kenneth M. Zangwill*
- **1582** Using clinical decision support to improve urine testing and antibiotic utilization *Michael E. Yarrington, Staci S. Reynolds, Tray Dunkerson, Fabienne McClellan, Christopher R. Polage, Rebekah W. Moehring, Becky A. Smith, Jessica L. Seidelman, Sarah S. Lewis and Sonali D. Advani*

Cover image: Nile's Joy, Horses & Hope, 2006

- **1587** Longitudinal rates, risk factors, and costs of superficial and deep incisional surgical-site infection (SSI) after primary and revision total knee arthroplasty: A US retrospective claims database analysis *Charles E. Edmiston, Maureen Spencer, Najmuddin J. Gunja, Chantal E. Holy, Jill W. Ruppenkamp and David J. Leaper*
- **1596** Association between in situ steroids and spine surgical site infections among instrumented procedures *James E. Lee, Kathleen O. Stewart, Jessica L. Swain, Evalina Bond, Michael S. Calderwood and Justin J. Kim*
- **1601** Surveillance of surgical site infection after colorectal surgery: comprehensiveness and impact of risk factors *Rui M. Malheiro, Bárbara Peleteiro, Goreti Silva, Ana Lebre, José Artur Paiva and Sofia Correia*
- 1607 Complex cardiac implantable electronic device infections in Alberta, Canada: An epidemiologic cohort study of validated administrative data
 Teagan L. King, Derek S. Chew, Jenine Leal, Kristine Cannon, Derek V. Exner, Stephanie Smith, Oscar Larios, Kathryn Bush, Brian Yuen, Zuying Zhang and Elissa Rennert-May
- 1614 Estimating the effect of active detection and isolation on *Clostridioides difficile* infections in a bone marrow transplant unit *Kelly A. Reagan, David M. Chan, Ginger Vanhoozer and Gonzalo Bearman*
- **1620** The association between socioeconomic factors and the success of decolonization treatment among individuals diagnosed with methicillin-resistant *Staphylococcus aureus*: A cohort study from 2007 to 2020 *Mette Assenholm Kristensen, Julia Skov Abrantes, Hanne Irene Jensen, Christian Backer Mogensen, Jens Søndergaard and Jens Kjølseth Møller*
- **1629** The incidence, duration, risk factors, and age-based variation of missed opportunities to diagnose pertussis: A population-based cohort study *Nicholas J. Evans, Alan T. Arakkal, Joseph E. Cavanaugh, Jason G. Newland, Philip M. Polgreen and Aaron C. Miller*
- 1637 Nosocomial influenza in a pediatric general ward: Effects of isolation and cohort placement of children with influenza Woosuck Suh and Seung Beom Han
- 1643 Risk factors associated with severe acute respiratory coronavirus virus 2 (SARS-CoV-2) transmission, outbreak duration, and mortality in acute-care settings *Tamara R. Duncombe, Matthew Garrod, Xuetao Wang, Joyce Ng, Eunsun Lee, Katy Short and Kennard Tan*
- 1650 Incidence and risk factors for clinically confirmed secondary bacterial infections in patients hospitalized for coronavirus disease 2019 (COVID-19)
 Hiromichi S. Park, Caitlin M. McCracken, Noah Lininger, Cara D. Varley, Monica K. Sikka, Christopher Evans, Angela Holly Villamagna, Jina T. Makadia and Jessina C. McGregor
- 1657 Knowledge, beliefs, and practices related to coronavirus disease 2019 (COVID-19) infection and vaccination in healthcare personnel working at nonacute care facilities
 Armaghan-e-Rehman Mansoor, Caroline A. O'Neil, David McDonald, Victoria J. Fraser, Hilary M. Babcock, Jennie H. Kwon and for the CDC Prevention Epicenters Program

Concise Communication

1663 Sensitivity of National Healthcare Safety Network definitions to capture healthcare-associated transmission identified by whole-genome sequencing surveillance *Alexander J. Sundermann, Joseph Penzelik, Ashley Ayres, Graham M. Snyder and Lee H. Harrison*

- **1666** Active screening and patient-placement and cohort-placement strategies to decrease carbapenem-resistant gram-negative bacilli colonization and infection in pediatric patients: A 5-year retrospective observational study in China *LJ Yin, LY He, GP Lu, Y Cao, LS Wang, XW Zhai and CQ Wang*
- **1670** Carbapenem-resistant *Acinetobacter baumannii* load in patients and their environment: the importance of detecting carriers *Vered Schechner, Anat Or Lerner, Elizabeth Temkin and Yehuda Carmeli*
- **1673** Identification and control of two outbreaks of unrelated New Delhi metallo-β-lactamase–producing carbapenem-resistant *Escherichia coli* traced to the same endoscope defect *Halima K. Dabaja-Younis, Vered Schechner, Ibrahim Firan, Iyad Khamaysi, Gabrielle D. Levi, Mor N. Lurie-Weinberger, Avi Weissman, Yuri Guriel, Yuval Geffen and Khetam Hussein*
- **1676** A do-it-yourself test protocol using commercial *Bacillus atrophaeus* spores to evaluate the effectiveness of ultraviolet-C light room-decontamination devices *Jennifer L. Cadnum and Curtis J. Donskey*
- **1680** Genotypic investigation of a rotavirus cluster at a quaternary-care pediatric hospital Eimear M. Kitt, Hee-won Yoon, Courtney E. Comar, Kenneth P. Smith, Rebecca M. Harris, Mathew D. Esona, Rashi Gautam, Slavica Mijatovic-Rustempasic, Amy L. Hopkins, Jose Jaimes and Lori K. Handy
- 1683 Does marking as sterile mean really sterile? Stenotrophomonas maltophilia outbreak caused by a blood-gas injector containing liquid heparin Gülçin Telli Dizman, Gökhan Metan, Gizem Karahan, Elif Seren Tanrıverdi, Gülşen Hazırolan, Barış Otlu, Meliha Çağla Sönmezer, Nur Dilek Gül, Burcu Çınar and Serhat Ünal
- 1686 Large hospital-wide outbreak of Paenibacillus spp pseudobacteremia associated with contaminated nonsterile gloves
 Guilherme Geraldo Lovato Sorio, Beatriz Arns, Cristiane Tejada da Silva Kawski, Patricia Machado Gleit, Gabriela Pereira Flores, Erik Menezes Martins, Muriel Gorges, Renata Dortzbacher Feil Klafke, Marcelle Duarte Alves, Cibele Massotti Magagnin, Jorge Luiz Mello Sampaio and Alexandre Prehn Zavascki
- 1690 Feasibility and impact of a monoclonal antibody infusion program in reaching vulnerable underserved communities
 Alfredo J. Mena Lora, Stephanie L. Echeverria, Brenna Lindsey, Ella Li, Lawrence Sanchez, Tiffany Truesdell, Eden Takhsh, Romeen Lavani and Rodrigo Burgos
- **1693** Sickness presenteeism in healthcare workers during the coronavirus disease 2019 (COVID-19) pandemic: An observational cohort study *Katherine Linsenmeyer, David Mohr, Kalpana Gupta, Sucheta Doshi, Allen L. Gifford and Michael E. Charness*

Research Brief

- **1697** Central-line–associated bloodstream infections secondary to anaerobes: Time for a definition change? *Jessica L. Seidelman, Ibukunoluwa C. Kalu, Sarah S. Lewis, Deverick J. Anderson and Becky A. Smith*
- **1698** Incidence and outcomes of hospital-associated coronavirus disease 2019 (COVID-19) before and after emergence of the severe acute respiratory coronavirus virus 2 (SARS-CoV-2) omicron variant *Victoria R. Williams, Charlie Tan, Robert Kozak and Jerome A. Leis*
- 1701 Pandemic hits: Evaluation of an antimicrobial stewardship program website for hospital communication during the coronavirus disease 2019 (COVID-19) pandemic
 Reinaldo Perez, Michael E. Yarrington, Martha B. Adams, Connor R. Deri, Richard H. Drew, Michael J. Smith, Justin Spivey, Rebekah H. Wrenn and Rebekah W. Moehring

Letter to the Editor

1704 Clean hospitals day 2023 marks the global launch of a self-assessment tool *Alexandra Peters, Pierre Parneix and Didier Pittet on the behalf of Clean Hospitals*

Erratum

1705 Prospective evaluation of data-driven models to predict daily risk of *Clostridioides difficile* infection at 2 large academic health centers – ERRATUM
 Meghana Kamineni, Erkin Ötleş, Jeeheh Oh, Krishna Rao, Vincent B. Young, Benjamin Y. Li, Lauren R. West, David C. Hooper, Erica S. Shenoy, John G. Guttag, Jenna Wiens and Maggie Makar

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

An Official Publication of the Society for Healthcare Epidemiology of America

EDITOR-IN-CHIEF

David P. Calfee, MD, MS • New York, NY, USA

DEPUTY EDITOR David Weber, MD, MPH • Chapel Hill, NC, USA

ASSOCIATE EDITORS

Westyn Branch-Elliman, MD, MMSc • Boston, MA, USA Carol Chenoweth, MD • Ann Arbor, MI, USA Tara N. Palmore, M.D., Washington, D.C. Trevor C. Van Schooneveld, MD • Omaha, NE, USA

STATISTICS CONSULTANTS

Jon P. Furuno, PhD • Portland, OR, USA Jessina C. McGregor, PhD • Portland, OR, USA

MANAGING EDITOR

iche.managingeditor@shea-online.org Lindsay MacMurray • Brooklyn, NY, USA

SOCIAL MEDIA EDITOR

Alexander J. Sundermann, DrPH, CIC, FAPIC, Pittsburgh, PA, USA

PAST EDITORS, INFECTION CONTROL

Richard P. Wenzel, MD, Infection Control 1980-1987 (vols. 1-8)

PAST EDITORS, INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

Richard P. Wenzel, MD, 1988-1992 (vols. 9-13) Michael D. Decker, MD, 1993-2001 (vols. 14-22) Barry M. Farr, MD, 2000-2004 (vols. 23-25) William R. Jarvis, MD, 2005-2006 (vols. 26 and 27) Suzanne F. Bradley, MD, 2007-2021 (vols. 28-42)

EDITORIAL ADVISORY BOARD

Deverick Anderson, MD, MPH • Durham, NC, USA

Anucha Apisarnthanarak, MD • Pratumthani, Thailand Lennox Archibald, MD, FRCP • Alachua, FL, USA Jo Anne Bennett, RN, PhD • New York, NY, USA David Birnbaum, PhD, MPH • Sidney, BC, Canada Yehuda Carmeli, MD, MPH • Tel Aviv, Israel Vincent C.C. Cheng, MBBS, MD. • Hong Kong, China Jan Evans Patterson, MD • San Antonio, TX, USA Christopher Crnich, MD, MS • Madison, WI, USA Erika D' Agata, MD, MPH • Providence, RI, USA Daniel Diekema, MD • Portland, ME, USA Elizabeth Dodds Ashley, PharmD • Durham City, NC, USA Curtis J. Donskey, MD • Cleveland, OH, USA Charles E. Edmiston, Jr., PhD • Milwaukee, WI, USA Katherine Ellingson, PhD • Tucson, AZ, USA Charlesnika T. Evans, PhD • Chicago, IL, USA Mohamad Fakih, MD, MPH • Grosse Pointe Woods, MI, USA Jeffery Gerber, MD, PhD • Philadelphia, PA, USA Dale N. Gerding, MD • Hines, IL, USA Donald A. Goldmann, MD • Boston, MA, USA Nicholas Graves, PhD • Singapore, Singapore Donna Haiduven, PhD, RN, CIC, CPH, FAPIC • Tampa, FL, USA Anthony D. Harris, MD, MPH • Baltimore, MD, USA David K. Henderson, MD • Bethesda, MD, USA Elizabeth Henderson, PhD • Calgary, AB, Canada Loreen A. Herwaldt, MD • Iowa City, IA, USA John A. Jernigan, MD, MS • Atlanta, GA, USA Robin L.P. Jump, MD, PhD • Cleveland, OH, USA Mini Kamboj, MD • New York, NY, USA Carol A. Kauffman, MD • Ann Arbor, MI, USA Michael Klompas, MD • MPH, Boston, MA, USA Sarah Krein, RN, PhD • Ann Arbor, MI, USA Karl Madaras-Kelly, PharmD • MPH, Boise, ID, USA

Eric T. Lofgren, MS, PhD • Pullman, WA, USA

Didier Pittet, MD, MS • Geneva, Switzerland Anusha Rohit, MD, PhD • Dip RCPath, Chennai, India William A. Rutala, PhD, MPH • Chapel Hill, NC, USA Lisa Saiman, MD, MPH • New York, NY, USA Sanjay Saint, MD, MPH • Ann Arbor, MI, USA Joshua K. Schaffzin, MD, PhD • Ottawa, ON, Canada Sorana Segal-Maurer, MD • Flushing, NY, USA Lynne M. Sehulster, PhD • Atlanta, GA, USA John A. Sellick, DO • Amherst, NY, USA Erica S. Shenoy, MD, PhD • Boston, MA, USA Anna C. Sick-Samuels, MD, MPH • Baltimore, MD, USA Arjun Srinivasan, MD • Atlanta, GA, USA Kurt Stevenson, MD • MPH, Boise, ID, USA. Nimalie Stone, MD • Atlanta, GA, USA Thomas Talbot, MD MPH, • Nashville, TN, USA Paul Tambyah, MBBS • Singapore William Trick, MD • Chicago, IL, USA Antoni Trilla, MD, PhD • Barcelona, Spain Kavita Trivedi, MD • Alameda Country Public Health Department, San Leandro, CA, USA Robert A. Weinstein, MD • Chicago, IL, USA Andreas Widmer, MD, MS • Basel, Switzerland

Jasmine R. Marcelin, MD • Omaha, NE, USA

Allison McGeer, MD • Toronto, ON, Canada

Linda Mundy, MD • Collegeville, PA, USA

David A. Pegues, MD • Philadelphia, PA, USA

Leonard A. Mermel, DO, ScM • Providence, RI, USA

Ann-Christine Nyquist, MD, MSPH • Aurora, CO, USA

Marcus Zervos, MD • Detroit, MI, USA

Infection Control & Hospital Epidemiology (ISSN 0899-823X) is published monthly by Cambridge University Press, One Liberty Plaza, New York, NY 10006, USA.

Editorial Office

Communications should be addressed to the Editor, Infection Control & Hospital Epidemiology, One Liberty Plaza, New York, NY 10006 (email: iche.managingeditor@cambridge.org. Contributors should consult the Instructions for Contributors, which is available at the journal's Web site.

Advertising

Please direct advertising inquiries to M. J. Mrvica Associates, 2 West Taunton Avenue, Berlin, NJ 08009 (e-mail: mjmrvica@mrvica.com; telephone: 856-768-9360, fax: 856-753-0064). Publication of an advertisement in Infection Control & Hospital Epidemiology does not imply endorsement of its claims by the Society for Healthcare Epidemiology of America, by the Editor, or by Cambridge University Press.

Permissions

Articles may be copied or otherwise reused without permission only to the extent permitted by Sections 107 and 108 of the US Copyright Law. Permission to copy articles for personal, internal, classroom, or library use may be obtained from the Copyright Clearance Center (http://www.copyright.com, email: info@copyright.com). For all other uses, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, please contact Cambridge University Press. Full details may be found at: www.cambridge.org/about-us/rights-permissions.

Subscriptions

The individual subscription prices for 2023 are: Print & Online: \$305; Online Only: \$236. Individuals have the option to order directly from Cambridge University Press. Institutional print + electronic and e-only subscriptions are available from Cambridge University Press and include unlimited online access; rates are tiered according to an institution's type and research output and may be reviewed at the journal's homepage on Cambridge Core: cambridge.org/ICHE.

Please direct subscription inquiries and requests for back issues to Customer Services at Cambridge University Press, e-mail: subscriptions_newyork@ cambridge.org (USA, Canada, and Mexico) or journals@cambridge.org (outside of USA, Canada, and Mexico).

Postmaster: Send address changes to Infection Control & Hospital Epidemiology, Cambridge University Press, One Liberty Plaza, New York, NY 10006 USA.

About the cover:



Title: Nile's Joy, Horses & Hope, 2006

Beginning with volume 43 (January 2022), the cover of *Infection Control & Hospital Epidemiology* (ICHE) will feature art inspired by or reflective of topics within the scope of the journal and their impact on patients, healthcare personnel and our society. These topics include healthcare-associated infections, antimicrobial resistance, and healthcare epidemiology. The intent is to feature original artwork that has been created by individuals who have a personal connection to one or more of these topics through their clinical work, research, or experience as a patient or an affected patient's family member, friend or advocate. The goal is to provide readers with a visual reminder of the human impact of the topics addressed in the journal and the importance of the work being done by those who read or contribute to ICHE and by all who are trying to make healthcare safer through the elimination of healthcare-associated infections.

For more information about the ICHE cover and how to submit artwork for consideration for a future cover, please visit the ICHE website: https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/front-covers

Artist: Nile Moss (1990-2006) Medium: Tissue paper, stained glass technique

Nile's parents, Carole and Ty Moss, spoke to ICHE about his artwork.

What was the inspiration for this artwork? Nile began every morning with a loud announcement, "It's going to be such a great day!" At the end of the day, he would jump off the school bus and announce, "I had such a great day!" Nile's love of horses began very early in life thanks to his school's participation at a nearby therapeutic riding center. His horses brought him great joy and his faith gave him the hope and promise of a rainbow every day. This piece was inspired by the love Nile had for his horses, Tex and Clutch.

Why is this work appropriate for the cover of *Infection Control & Hospital Epidemiology*? Nile's art expression and techniques blossomed from August 2005 to April 2006 in his first high school art class. He returned home with this final creation on April 14, 2006. His life ended only days later when physicians failed to recognize the initial symptoms of sepsis caused by methicillin-resistant *Staphylococcus aureus* (MRSA) that he had acquired while receiving care in a local hospital. Nile's story represents the preventable harm that happens when people are unaware and unprepared to protect their loved ones and their patients. Patient safety begins with a robust bench of healthcare professionals, including healthcare epidemiologists, infection preventionists and antimicrobial stewards, that are given the knowledge, tools, training and support they need to do their work effectively. Our healthcare professionals deserve to feel joy and hope at the start of each new day, just as Nile did, and not doubt that their hard work saving lives is appreciated.

What is your personnel connection to the content of ICHE? When Nile died, our lives were changed forever. After researching the "why" and the "how," we decided to become a part of the solution to end preventable harm in honor of Nile. We became educated on the science of infection prevention to help inform and empower the public and educate healthcare professionals about what happens when healthcare facilities don't maintain a culture of safety and allow preventable healthcare-associated infections to occur. We celebrate his life every day by empowering the public and healthcare professionals with our story of prevention and action to end preventable healthcare harm.

Carole and Ty Moss are the founders and Executive Directors of Nile's Project, a non-profit organization founded in 2007 to end unnecessary deaths due to preventable hospital-acquired infections. Nile's Project works with survivors, families, healthcare professionals, public health officials, and other advocacy groups to increase public awareness and advocate for changes that will make the healthcare system safer. For more information, visit www.nilesproject.com.

Cover image: Nile's Joy, Horses & Hope, 2006